Trials@uspto.gov
571.272.7822

Paper 13
Entered: January 31, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

_____

BEFORE THE PATENT TRIAL AND APPEAL BOARD

_____

FUJITSU NETWORK COMMUNICATIONS, INC.,
Petitioner,

v.

CORE OPTICAL TECHNOLOGIES, LLC,
Patent Owner.

_____

Case IPR2016-01618
Patent 6,782,211 B1

_____

Before KEN B. BARRETT, PATRICK M. BOUCHER, and
MELISSA A. HAAPALA, *Administrative Patent Judges*.

HAAPALA, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

IPR2016-01618 B1
Patent 6,782,211

Fujitsu Network Communications, Inc. ("Petitioner") filed a Petition pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 15–18, 23, 25, 30, 32, 33, 35, and 37 of U.S. Patent No. 6,782,211 B1 ("the '211 patent"). Paper 1 ("Pet."). Core Optical Technologies, LLC ("Patent Owner") filed a Preliminary Response. Paper 8 ("Prelim. Resp."). Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we deny Petitioner's request and do not institute an *inter partes* review.

I. BACKGROUND

A. *The '211 Patent (Ex. 1001)*

The '211 patent describes a cross-polarization interference canceler ("XPIC") that enables reconstruction of two optical signals transmitted with generally orthogonal polarization states in the same frequency band. Ex. 1001, 3:10–18. During propagation through an optical fiber, the orthogonality of two optical signal fields is lost to some extent, resulting in cross polarization interference ("XPI") at the receiver. *Id.* at 2:43–48. The XPIC mitigates dispersion effects and loss of optical field orthogonality incurred during propagation through the optical fiber. *Id.* at 1:12–19.

Figure 3 of the '211 patent is reproduced below:

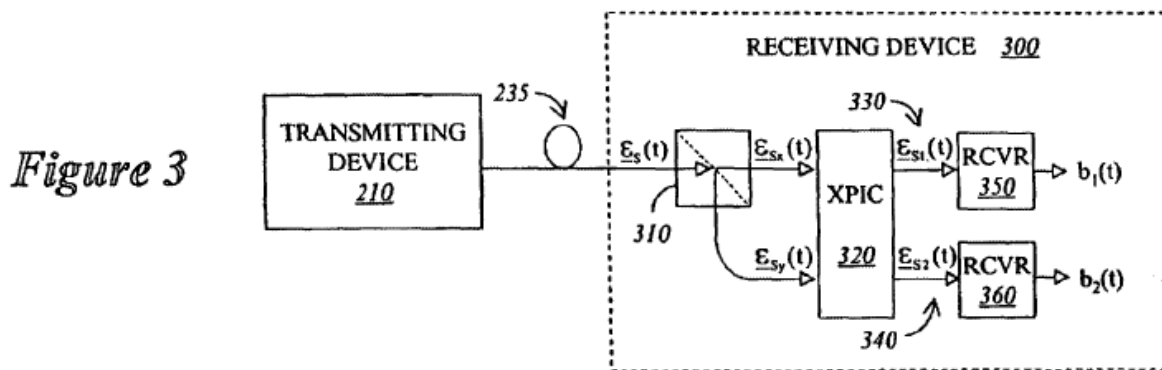IPR2016-01618 B1
Patent 6,782,211

Figure 3

Figure 3 is an illustrative embodiment of a device utilizing an optical XPIC. *Id.* at 7:1–2. Transmitting device 200 produces two modulated optical signals with orthogonally polarized electric fields that are transmitted over optical fiber 235 to receiving device 300. *See id.* at 4:56–66, 5:18–21. The optical system is modeled mathematically using matrices. *See id.* at 5:39–7:57. Receiving device 300 includes polarization beam splitter 310 and optical XPIC 320. *Id.* at 7:2–5. Polarization beam splitter 310 separates the received optical signals into its two components, which are processed by XPIC 320. *Id.* at 7:5–9. XPIC 320 may be a diagonalizer that diagonalizes the overall link transmission matrix to eliminate XPI and dispersion effects. *See id.* at 7:58–8:57.

The '211 patent describes additional exemplary embodiments in which XPIC is implemented optically or electrically. *See id.* at Figs. 5, 6, 9, 4:32-34, 4:45–51. Additionally, the '211 patent describes XPIC may provide a minimum mean square error (MMSE) solution, rather than act as a diagonalizer. *See id.* at 16:21–27.

B. *Illustrative Claim*

Claims 15, 30, 33, 35, and 37 are independent claims. Claim 15 is illustrative of the subject matter of the claims at issue:

IPR2016-01618 B1
Patent 6,782,211

15. Implemented to receive an incoming optical signal, a receiving device comprising:

a first polarization beam splitter to separate a received optical signal field of the incoming optical signal into orthogonally polarized components; and

a cross polarization interference canceler following the first polarization beam splitter, the cross polarization interference canceler comprises a plurality of outputs and a plurality of elements each supporting a transfer function, each output of the plurality of outputs being the sum of at least two element outputs.

C. References

Petitioner relies on the following references:

1. U.S. Patent No. 4,631,734, issued Dec. 23, 1986 ("Foschini") (Ex. 1007).
2. Cusani, Roberto et al., *An Efficient Multilevel Coherent Optical System: M-4Q-QAM*, 10 J. LIGHTWAVE TECH. 777–786 (1992) ("Cusani") (Ex. 1004).
3. Chikama, Terumi et al., *Modulation and Demodulation Techniques in Optical Heterodyne PSK Transmission Systems*, 8 J. LIGHTWAVE TECH. 309–322 (1990) ("Chikama") (Ex. 1005).
4. Kavehrad, M., *Performance of Cross-Polarized M-ary QAM Signals Over Nondispersive Fading Channels*, 63 AT&T Bell Lab. Tech. J. 499–521 (1984) ("Kavehrad") (Ex. 1008).
5. Hsieh, S.T. et al., *A Comparison of Three-Diagonalizers, Adaptive Crosstalk Cancellers, in Dual-Polarized M-QAM Systems*, 39 IEEE TRANSACTIONS ON COMMUNICATIONS 390–393 (1991) ("Hsieh") (Ex. 1009).

D. Grounds Asserted

Petitioner challenges the patentability of the claims of the '211 patent under 35 U.S.C. § 103(a) over the following combinations of references:

IPR2016-01618 B1
Patent 6,782,211

Reference(s)	Claim(s)
Cusani	15–18, 23, 25, 30, 32, 33, 35, and 37
Cusani and Chikama	16–18
Cusani and Foschini	33
Cusani and Kavehrad	35
Cusani and Hsieh	37

E. Related Proceedings

Petitioner and Patent Owner identify the following related proceedings: (1) *Core Optical Techs., LLC v. Fujitsu Network Comms. Inc.*, Case No. 8:16-cv-00437 (C.D. Cal); and (2) *Core Optical Techs., LLC. V. Ciena Corp.*, Case No. 8:12-cv-01872 (C.D. Cal). Pet. 3–4, Paper 6, 1.

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claims of an unexpired patent are interpreted using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under that standard, claim terms are generally given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

1. "cross polarization interference (XPI)"

This term appears in all challenged claims, either directly or as part of the term "cross polarization interference canceler" discussed below. Petitioner provides the parties' proposed preliminary constructions for this term in the related *Fujitsu* district court proceeding and the District Court's

IPR2016-01618 B1
Patent 6,782,211

construction in the *Ciena* proceeding. Pet. 12–13. However, Petitioner does not specifically advocate a construction for this proceeding, but rather asserts no construction is necessary for this term. *Id.* at 12.

Patent Owner contends we should construe this term as "signal crosstalk resulting from at least the loss of orthogonality of two optical signals transmitted in generally orthogonal polarization states within the same frequency band," which mirrors its proposed construction in the *Fujitsu* litigation. Prelim. Resp. 17–23; Ex. 1028. Patent Owner asserts its construction is supported by the claim language, the specification, and the prosecution history. *Id.* at 19–20. Patent Owner further asserts the District Court's claim construction in the *Ciena* litigation as "signal crosstalk" was a stipulated term with a general construction intended only for purposes of that litigation. *Id.* at 21–23. Patent Owner argues this general construction should not be used for this proceeding because it effectively reads out the word "polarization." *Id.* at 21. Patent Owner relies on testimony of its witness, Russell A. Chipman, Ph.D., to support its contentions regarding how a person of ordinary skill in the art would view the claims and specification. *See id.* 10–16 (citing Ex. 2001). Additionally, Patent Owner argues that tying XPI to loss of orthogonality is supported by Petitioner's witness, Paul R. Prucnal, Ph.D.. Prelim. Resp. 9, 22 (citing Ex. 1003, ¶ 80).

Based on the record before us, and for purposes of this Decision, we are persuaded by Patent Owner's arguments that, under the claim-construction standard we apply, XPI should be construed as crosstalk that results from the loss of orthogonality of two signals transmitted in generally orthogonal polarization states within the same frequency band. Patent Owner adequately shows this construction is consistent with the ordinary and customary meaning of the term in the context of the entire disclosure of

IPR2016-01618 B1
Patent 6,782,211

the '211 patent. In particular, the '211 patent describes the loss of orthogonality of two signals during propagation through the optical fiber incurs a signal crosstalk penalty at the receiver, known as cross polarization interference (XPI). Ex. 1001, 2:43–48; *see also id.* at 2:31–43; 3:14–18 (describing the two signals are transmitted in the same frequency band with orthogonal polarization). The '211 patent distinguishes XPI from polarization mode dispersion. *See id.* at 2:51–53. Furthermore, Patent Owner sufficiently establishes the *Ciena* litigation construction was a stipulated construction, acknowledged by the Court to be "a very general construction of XPI." We are persuaded, for purposes of this Decision, that to generally construe XPI as simply "signal crosstalk" would effectively read out "polarization" from the term.

But we are not persuaded on the current record that the broadest reasonable interpretation of XPI is limited to the loss of orthogonality of two *optical* signals. In particular, Patent Owner does not sufficiently explain why one of ordinary skill would have understood XPI to be limited to only loss of orthogonality occurring in optical signals. Moreover, we observe the challenged claims recite separately that the signals are optical signals, and, therefore, it appears superfluous to limit XPI to optical signals. Accordingly, for purposes of this Decision, we construe "cross polarization interference (XPI)" as "signal crosstalk resulting from the loss of orthogonality of two signals transmitted in generally orthogonal polarization states within the same frequency band."

2. "cross polarization interference canceler (XPIC)"

This term appears in challenged claims 15–18, 23, 25, 30, and 32. Although Petitioner provides constructions for this term used in the *Fujitsu* and *Ciena* district court proceedings, Petitioner does not specifically

IPR2016-01618 B1
Patent 6,782,211

advocate a construction for this proceeding, but rather asserts no construction is necessary for this term. *See* Pet. 12–13. Patent Owner contends we should construe this term as "circuitry, optical components, and/or software to reconstruct two signals that were optically transmitted with generally orthogonal polarization states to at least mitigate XPI," again substantially mirroring its proposed construction in the *Fujitsu* litigation. Prelim. Resp. 23–25; Ex. 1028. Patent Owner argues the proper interpretation of this term must include the idea of mitigating XPI. *Id.* at 24. Patent Owner asserts the specification of the '211 patent supports its construction and further cites to testimony of both its expert, Dr. Chipman, and Petitioner's witness, Dr. Prucnal. *See id.* at 24–25.

Based on the record before us, and for purposes of this Decision, we are persuaded by Patent Owner's argument that XPIC requires mitigation of XPI. We agree with Patent Owner that the '211 patent describes XPIC as a device that mitigates XPI. *See* Ex. 1001, 7:62–67, 10:2–4. We further agree that Petitioner's witness, Dr. Prucnal, describes XPIC as "a component in the receiver that cancels the effects of cross polarization interference." *See* Ex. 1003, ¶ 37. However, for similar reasons discussed previously, we are not persuaded, based on the record before us, that the broadest reasonable interpretation of XPIC is limited to two signals that were *optically* transmitted. *See* discussion *supra* Part II.A.1.

Accordingly, for purposes of this Decision, we construe "cross polarization interference canceler (XPIC)" as "circuitry, optical components, and/or software to reconstruct two signals, which were transmitted with generally orthogonal polarization states, to mitigate XPI."

IPR2016-01618 B1
Patent 6,782,211

3. Other Terms

Patent Owner proposes constructions for a number of additional terms that appear in the claims of the '211 patent. *See* Prelim. Resp. 9 n.2, 26–27. For purposes of this Decision, we do not find it necessary to construe these terms, and accord them their ordinary and customary meaning. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that "only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy").

B. Obviousness over Cusani

Petitioner contends that claims 15–18, 23, 25, 30, 32, 33, 35, and 37 are unpatentable as obvious under 35 U.S.C. § 103(a) over Cusani. *See* Pet. 32–83. For the reasons that follow, Petitioner fails to demonstrate a reasonable likelihood of prevailing on these grounds.

Cusani describes a coherent multilevel optical transmission system. Ex. 1004, 777. Figure 2 of Cusani is reproduced below.
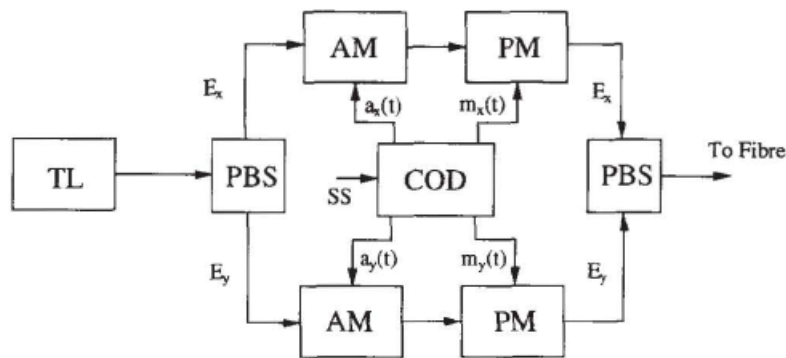

Fig. 2.   Block scheme of the second proposed transmitter; TL = transmitting laser, PBS = polarization beam splitter, AM = amplitude modulator, PM = phase modulator, COM = encoder.

Figure 2 depicts a transmitter block scheme suitable for the proposed modulation form. *Id.* at 778. The laser input from transmitting laser TL is divided into its polarization components by polarization beam splitter PBS.

IPR2016-01618 B1
Patent 6,782,211

Id. The polarization components are both amplitude and phase modulated.
Id. After the modulation stages, the two polarization components are
superimposed and fed into the fiber. *Id.* Cusani further describes the effect
of fiber propagation can be evaluated by means of a fiber variable, a phase-
shift variable, and a Jones matrix, which is a unitary operator that takes into
account the polarization evolution along the fiber due to coupling between
the polarization modes. *Id.* at 779.

Petitioner asserts Cusani teaches the XPIC set forth in claims 15–18,
23, 25, 30, and 32. *See* Pet. 35–38, 58–60. Petitioner further asserts Cusani
teaches mitigating XPI (as recited in claims 33 and 35) and eliminating XPI
(as recited in claim 37). *See id.* at 65–66, 74–75, 78–83. Specifically,
Petitioner maps the "inverse Jones matrix J^{-1}_r" described in Cusani to the
claimed XPIC. *Id.* at 35–38, 58–60. Petitioner argues that the Jones matrix
described in Cusani represents XPI (e.g., coupling between polarization
modes) and that applying the inverse Jones matrix undoes the interference
represented by the Jones matrix, thus compensating for fiber induced
polarization fluctuations. *Id.* Therefore, Petitioner argues a person of skill
in the art would have understood Cusani's disclosure of circuitry applying an
inverse Jones matrix J^{-1}_r is an XPIC. *Id.* at 37. Petitioner similarly relies on
Cusani's disclosure of circuitry applying the inverse Jones matrix to teach
mitigating/eliminating XPI. *See id.* at 65–66, 74–75, 78–83. In support of
its contentions, Petitioner relies on the testimony of Dr. Prucnal. *See e.g., id.*
at 37 (citing Ex. 1003).

Patent Owner contends that Petitioner improperly equates XPI and
loss of orthogonality to Cusani's disclosure of polarization fluctuations due
to coupling between the polarization modes. Prelim. Resp. 28–31. Patent
Owner asserts that Cusani discloses neither signal crosstalk nor loss of

10

IPR2016-01618 B1
Patent 6,782,211

orthogonality, but is rather directed to polarization rotation. *Id.* at 29. Thus, Patent Owner argues that because Cusani does not disclose XPI, it does not disclose eliminating or mitigating XPI or an XPIC that by definition cancels or mitigates XPI. *See id.* at 28–36.

In support of its assertions, Patent Owner relies on testimony from two of the authors of Cusani, Roberto Cusani, Ph.D., and Eugenio Iannone. *See id.* at 29–32 (citing Ex. 2002, 2003). Patent Owner argues that both authors support its assertions that the disclosed "coupling between polarization modes" is not loss of orthogonality between the polarization components and that the unitary Jones matrix used to model the effect of the fiber transmission operator cannot be used to represent XPI. Prelim. Resp. at 31–32. Patent Owner's assertions are also supported by testimony of its witness, Joseph M. Kahn, Ph.D. *See id.* at 29–31 (citing Ex. 2002).

We are persuaded by Patent Owner's arguments. For purposes of deciding whether to institute an *inter partes* review, we view a genuine issue of material fact created by a patent owner's testimonial evidence in the light most favorable to the petitioner. *See* 37 C.F.R. § 42.108(c). However, even viewing Patent Owner's testimonial evidence in the light most favorable to Petitioner, we agree with Patent Owner that Petitioner does not sufficiently establish that Cusani teaches the claimed "XPI" as we construe the term, namely signal crosstalk resulting from the loss of orthogonality of two signals transmitted in generally orthogonal polarization states within the same frequency band.

In the portions of Cusani cited by Petitioner as disclosing XPI, Cusani describes that the Jones matrix J takes into account the polarization evolution along the fiber due to coupling between the polarization modes. Ex. 1004, 779. Cusani further describes the polarization fluctuations caused

11

IPR2016-01618 B1
Patent 6,782,211

by fiber birefringence and coupling cause a continuous rotation of FS (field space) that must be tracked. *Id.* at 781. Thus, contrary to Petitioner's assertion that the described "coupling" is XPI (Pet. 16), Cusani describes the polarization fluctuations caused by coupling result in a "continuous rotation," and does not describe that the coupling is signal crosstalk, let alone signal crosstalk resulting from loss of orthogonality of the two signals. Therefore, we conclude that Petitioner does not establish that the Jones matrix J represents XPI. Accordingly, we also conclude that Petitioner does not establish that the inverse Jones matrix J^{-1}_r, which compensates for the polarization fluctuations caused by coupling, discloses the claimed XPIC, as we construe the term, or eliminating/mitigating XPI.

Petitioner further argues that Cusani inherently discloses an XPIC. *See* Pet. 37, 60. Inherency may not be established by probabilities or possibilities, but rather is only present when the limitation at issue is the "natural result" of the prior art elements. *PAR Phar., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1195. Petitioner's conclusory argument is not sufficient to establish an XPIC is the natural result of the Jones matrix J^{-1}_r.

Petitioner additionally argues that it would have been obvious based on Cusani's disclosure to implement an XPIC in Cusani's optical system or to mitigate XPI. *See id.* at 37–38, 66, 82–83. In support of its conclusory assertion, Petitioner provides string citations to additional references not identified in its obviousness challenges, without providing any explanation of the teachings in these references that support its position. *See id.* at 37, 83. We give no weight to evidence where a party fails to state its relevance. *See* 37 C.F.R. § 42.104(b)(5). Therefore, Petitioner fails to establish that a person or ordinary skill would have found it routine and straightforward to implement an XPIC in Cusani's optical system and to mitigate XPI.

IPR2016-01618 B1
Patent 6,782,211

For the foregoing reasons, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing in establishing claims 15–18, 23, 25, 30, 32, 33, 35, and 37 would have been obvious over Cusani.

B. Obviousness over Cusani and Chikama, and Obviousness over Cusani and Foschini

Petitioner contends that claims 16–18 are unpatentable as obvious under 35 U.S.C. § 103(a) over Cusani and Chikama, and that claim 33 is unpatentable as obvious over Cusani and Foschini. *See* Pet. 41–49, 62–70. However, Petitioner does not assert that Chikama teaches the XPIC limitation recited in claims 16–18 (by virtue of their dependency from claim 15) or that Foschini teaches mitigating XPI, as recited in claim 33. *See id.* at 35–38, 65–66. Thus, Petitioner fails to cure the deficiency of Cusani discussed previously in Part II.B.2 *supra* and has not demonstrated a reasonable likelihood of prevailing on these challenges.

C. Obviousness over Cusani and Kavehrad, and Obviousness Over Cusani and Hsieh

Kavehrad describes an adaptive canceler that attempts to remove cross polarization distortion in radio channels by using a Least-Mean-Square (LMS) algorithm. Ex. 1008, 503. Hsieh describes a comparison of three diagonalizers used to reduce the problem of depolarization crosstalk in dually polarized radio channels. Ex. 1009, 597.

Petitioner contends that claim 35 would have been obvious over Cusani and Kavehrad, and claim 37 would have been obvious over Cusani and Hsieh. Pet. 70–83. Petitioner asserts Cusani and Kavehrad both concern solving the problem of XPI using a matrix-based canceler. Pet. 29. Petitioner argues a person of ordinary skill would have found it routine and straightforward to apply Kavehrad's teachings of an LMS canceler in

13

IPR2016-01618 B1
Patent 6,782,211

Cusani's receiver and would have recognized this combination would work as expected. *Id.* at 30. Petitioner similarly contends that Cusani and Hsieh both concern receiver structures that cancel XPI, and that a person of ordinary skill would have found it routine and straightforward to apply Hsieh's diagonalizer in Cusani's receiver. *Id.* at 30–31. Patent Owner argues there is no motivation to combine Cusani with Kavehrad or Hsieh because Cusani does not mitigate any loss of orthogonality between the components of the transmitted signals, and thus there would be no reason to implement the LMS canceler from Kavehrad or the diagonalizer from Hsieh in Cusani's receiver. *See* Prelim. Resp. 61–62.

Petitioner does not sufficiently explain why a person of ordinary skill would have combined the references. An obviousness analysis cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). As discussed previously, Petitioner does not establish that Cusani's receiver addresses XPI. Thus, Petitioner does not explain sufficiently why a person of ordinary skill would have been motivated to combine Cusani's optical receiver with Kavehrad and Hsieh's teachings addressing polarization cross talk or why the combination would be routine and straightforward. Accordingly, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing in its obviousness challenge over Cusani and Kavehrad, or in its obviousness challenge over Cusani and Hsieh.

IPR2016-01618 B1
Patent 6,782,211

III. ORDER

In view of the foregoing, it is:

ORDERED that Petitioner's request for *inter partes* review of claims

15–18, 23, 25, 30, 32, 33, 35, and 37 of U.S. Patent 6,782,211 is denied.

IPR2016-01618 B1
Patent 6,782,211

PETITIONER:

J. Baughman
sbaughman@paulweiss.com

Gabrielle E. Higgins
gabrielle.higgins@ropesgray.com

Alexander Middleton
alexander.middleton@ropesgray.com

PATENT OWNER:

Jason Eisenberg
jasone-ptab@skgf.com

Robert Sterne
rsterne@skgf.com

Jonathan Tuminaro
jtuminar-ptab@skgf.com

Ehab Samuel
esamuel-ptab@manatt.com

William Schaal
bschaal@rutan.com

Benjamin Deming
bdeming@rutan.com